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**DECLARATION OF PROFESSOR ANTHONY ACAMPORA REGARDING
CLAIM CONSTRUCTION FOR U.S. PATENT NO. 6,873,630**

1 I, Anthony Acampora, hereby declare:

2 The statements contained in this Declaration are true and correct. If called as a
3 witness, I would testify thereto under oath.

4 I have been retained by Plaintiff and Counterclaim Defendant NetApp, Inc. to
5 offer opinions regarding certain claim terms in U.S. Patent No. 6,873,630 ("630 Patent").

6 **I.**

7 **QUALIFICATIONS**

8 I am currently Professor Emeritus of Electrical and Computer Engineering at the
9 University of California, San Diego; have been the Director of the Center for Wireless
10 Communications at the University of California, San Diego; and have been Professor of Electrical
11 Engineering and Director of the Center for Telecommunications Research at Columbia
12 University. In addition I spent 20 years in industry as a researcher and research manager at
13 AT&T Bell Laboratories. My qualifications to render an expert opinion in the matter are set forth
14 in my Curriculum Vitae, which is attached as Exhibit A. My C.V. also includes a list of all
15 publications authored in the last 32 years.

16 **II.**

17 **STATEMENT OF OPINIONS – '630 PATENT**

18 A summary of my opinions regarding certain claim terms in the '630 patent is set
19 forth below. I reserve the right to modify or supplement my opinions as appropriate.

20 **A. ORDINARY SKILL IN THE ART**

21 One of ordinary skill in the art relevant to the '630 patent in 1999 would generally
22 have the following education and experience: a bachelor's or master's degree in Electrical or
23 Computer Engineering, or equivalent experience, and several years experience studying,
24 designing and/or using computer network systems.

25 My opinion is based upon my personal knowledge and experience and my
26 consideration of the following factors: (1) the levels of education and experience of persons of
27 skill working in the field; (2) the types of problems encountered in the art; (3) prior art patents
28

1 and publications; (4) the activities of others; (5) prior art solutions to the problems encountered by
 2 the inventor; (6) the sophistication of the technology; and (7) the rapidity with which innovations
 3 are made.

4 **B. BACKGROUND**

5 One of ordinary skill in the art reading the '630 patent in 1999 would have
 6 understood that it is directed generally to network architectures capable of operating at high data
 7 transmission rates. According to the '630 patent, in 1999 it was clear that networked computer
 8 systems running multi-media, database, and modeling applications, for example, would welcome
 9 the ability to communicate at data rates exceeding 1 gigabit per second. To this end, the '630
 10 patent describes a scheme in which a network communication, rather than being transmitted
 11 across a single channel, is divided into multiple logical channels by a network interface for
 12 subsequent transmission. According to the patent, the overall data transmission rate, rather than
 13 equaling the data rate for a single channel, is then approximately the sum of the data transmission
 14 rates for each of the logical channels.

15 The specification explains the basic mechanism underlying the alleged invention
 16 of the '630 patent for an exemplary configuration involving four channels as follows:

17 In one embodiment of the invention a distributor (e.g., distributor
 18 **204** of FIG. 2) accepts a stream of bytes from a MAC module or
 19 layer (e.g. a frame), and distributes individual bytes into sub-
 20 streams (e.g., mini-frames) in a round-robin fashion. As depicted in
 21 the embodiment of FIG. 2, four channels may be implemented with
 a 10GMII that is four bytes wide; therefore, each time the
 distributor receives another four bytes, one byte is submitted to
 each channel. In this manner, an Ethernet frame is divided into four
 mini-frames for transmission across a different channel.

22 '630 at 9:24-33. Thus, the '630 patent discloses a scheme in which the communication may be
 23 thought of in terms of three levels of granularity. First, and at the highest level, there are the
 24 "frames" that are received from a MAC module. These "frames" are then divided into individual
 25 "mini-frames" for transmission along individual communication channels. Finally, and at the
 26 lowest level of granularity, the "mini-frames" are made up of individual bytes that are ultimately
 27 encoded for transmission across the physical medium. *See id.* at 11:40-12:4. By breaking down a
 28 single communication, which is normally sent over a single channel, into smaller portions and

transmitting them across multiple channels, the '630 patent explains that a higher data transmission rate may be achieved.

C. THE DISPUTED TERMS

1. "Portion [of a] Communication" (Claims 3, 5, 12-15, 21-24, 45, 48, 50, 52-53, 73, 76)¹

One of ordinary skill in the art at the time the '630 patent's application was filed in 1999 would have understood that the term "portion of a communication" in the claims of the '630 patent means "the fraction or portion of a frame carried by one channel."

BASIS AND REASONS:

As an initial matter, the term "portion of a communication" is a vague term that simply does not have a well-defined meaning to one of skill in the art. Accordingly, to determine the meaning and scope of this term, one of ordinary skill would have to rely heavily upon the specification and claims in the '630 patent. Pertinent to this analysis, I have been informed that the parties have agreed upon the definitions for a number of claim terms. A review of these combined resources confirms that a "portion of a communication" is the "fraction or portion of a frame carried by one channel."

First, the specification makes clear that when the claims refer to a "portion of a communication," they must, at the very least, be referring to a "fraction or portion of a frame," where a "frame" is the communication unit emitted from or received by a MAC sublayer in the OSI reference model. The use of the word "frame" to represent a communication unit emitted from or received by a MAC sublayer is well known to those of skill in the art. This definition is explicitly confirmed in the specification of the '630 patent, and is therefore the definition I adopt for the purposes of this declaration. *See* '630 patent at 5:48-51 ("The terms 'frame' and 'packet' may be used interchangeably herein, and generally refer to the unit of information received from or sent to a MAC layer from a physical layer device."). The term "portion of a communication"

¹ References to claim numbers in this declaration are intended as reference aids, but do not limit the scope of my opinions. To the extent the terms defined in this report are found in claims other than those listed, the same terms in all claims share the same definition unless otherwise noted.

1 appears in the specification only once. *See id.* at 4:55-61. There, the specification explains that a
 2 “distributor” is responsible for “disseminat[ing] *portions of the communications* across the
 3 multiple channels.”² *See id.* The parties have agreed that a “distributor” is a module that divides
 4 “across multiple logical channels an Ethernet frame received from a MAC module.” *See* Agreed
 5 Constructions, Supplemental Joint Claim Construction and Prehearing Statement, Exh. Q
 6 [Document No. 74-8]. Thus, the parties have in fact already agreed that the only time the
 7 specification refers to a “portion of a communication” it is in fact referring to a fraction or portion
 8 of a “frame.”

9 This agreement is consistent with the way one of ordinary skill in the art in 1999
 10 would have understood the terms in light of the disclosure. The only embodiments disclosed in
 11 the specification in any meaningful way are those in which MAC layer “frames” are divided into
 12 the “portions of a communication” that the claims describe as being transmitted along logical
 13 channels. For instance, the specification defines the term “mini-frame,” as a “fraction or *portion*
 14 of a *frame* this is sent across one of multiple channels.”³ ’630 patent at 5:51-53. This term is
 15 used 45 times throughout the text of the specification to describe the alleged invention. For
 16 instance, Figures 3A and 3B describe the methods for transmitting and receiving a “packet,”
 17 which the specification explains should be understood to be synonymous with a “frame” in the
 18 context of the ’630 patent. *Id.* at 5:48-51.⁴ These figures describe the methods of transmitting
 19 and receiving in terms of “mini-frames.” Likewise, Figures 5A-5D depict the conversion of
 20 “frames . . . into multiple mini-frames for transmission across separate channels in accordance
 21 with one embodiment of the present invention.”

22 ² Emphasis added throughout, unless otherwise noted.

23 ³ Notably, when the specification uses the term “portion” by itself, it is only in connection with
 24 the pieces of a frame or packet that are sent across a single logical channel. *See* ’630 patent at
 25 2:48-51; 5:51-53; 12:19-21. That the specification consistently uses “portion” in connection with
 26 the pieces of frame or packet sent across a single logical channel is persuasive evidence that when
 the claims use the term “portion” they are also referring to such an entity.

27 ⁴ As someone of skill in the art, I can confirm that within the field of data communications, a
 28 “packet” is universally recognized to be synonymous with a “frame.”

1 Further demonstrating that a “portion of a communication” is a “fraction or portion
2 of a frame,” Figures 1 and 2 of the specification depict a “distributor” dividing communications
3 from a MAC module among multiple logical channels. *See id.* at Figures 1 and 2; *see also id.* at
4 5:48-51 (defining the “frame” as the unit of information “received from or sent to a MAC layer”).
5 Finally, the specification explains that the “portions of a single packet” delivered by a single
6 channel are received by a “collector.” But the parties have already agreed that a “collector” is an
7 entity that “reassembles an Ethernet frame to be provided to a MAC layer,” demonstrating that
8 the “portion of a single packet” must be referring to a portion of a “frame.” *See* Agreed
9 Constructions, Supplemental Joint Claim Construction and Prehearing Statement, Exh. Q
10 [Document No. 74-8].

11 Of note, the ’630 patent explains the deficiencies of dividing communications up at
12 some point at or above the MAC layer, such that “frames,” as defined in the patent, would not be
13 the entities broken up to form the “portions of a communication.” *See* ’630 patent at 8:24-43.
14 Specifically, the specification explains that such an approach was used in prior art 802.3 link
15 aggregation and would require “almost all of the network interface hardware used for present
16 Ethernet implementations [to be] duplicated.” By contrast, the invention of the ’630 patent
17 requires the duplication of only physical layer resources. *See id.* No additional details or
18 explanation are offered as to how striping could be achieved above the MAC layer (i.e., based on
19 something other than the use of “portions of communications” that are “fractions or portions of a
20 frame ”). This underscores that the ’630 patent is concerned only with the striping of data
21 received from a MAC sublayer, such that a “portion of a communication” can only correspond to
22 a “fraction or portion of a frame.”

23 My review of the claims in the ’630 patent confirms this understanding. For
24 instance, many independent claims referring to a “portion of a communication” refer expressly to
25 a “communication” as being received or sent to a “media access control module,” leaving no
26 doubt that a “portion of a communication” must refer to a “fraction or portion of a frame.” The
27 remaining independent claims include additional cues confirming that the “portion of a
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1 communication” is in fact a “fraction or portion of a frame.” For instance, claim 15 refers to the
2 process of “collecting” a “portion.” The “collecting” must be performed by the “collector,”
3 which the parties have agreed refers to a “module that reassembles an Ethernet frame to be
4 provided to a MAC layer,” confirming that the “portion” must be a “fraction or portion of a
5 frame.” *See* Agreed Constructions, Supplemental Joint Claim Construction and Prehearing
6 Statement, Exh. Q [Document No. 74-8].

7 NetApp’s proposed construction also requires that a “portion of a communication”
8 be “carried by one channel.” The claims demonstrate that this is also an attribute of a “portion of
9 a communication.” Indeed, none of the claims describe a “portion of a communication” as being
10 transmitted across multiple channels. Instead, the “portions of a communication” are always
11 linked to a single channel. For instance, Claim 3 calls for “sending a *first portion* of said
12 communication on a *first channel*,” and a “*second portion* of said communication on a *second*
13 *channel*.” *See* ’630 patent at 15:21-29. The specification confirms the understanding I gain from
14 the claims. For instance, in defining the term “mini-frame,” which is used throughout the
15 specification to describe the invention, the specification explains that it is the “portion of the
16 frame carried by *one channel*.” *See id.* at 2:48-49; *see also id.* at 5:51-53 (a “mini-frame” or
17 “mini-packet” is sent across “*one* of multiple channels”). Accordingly, when describing an
18 embodiment consisting of four channels, the specification explains that the “mini-frame” should
19 consist of “approximately one fourth of the original frame.” *See id.* at 9:64-67; *see also id.* at
20 9:48-50 (explaining that the “mini-frames” are the entities that the “collector” receives on “all
21 channels”). Likewise, in describing the process of receiving a packet at a collector, the
22 specification explains that “each channel” will deliver “portions of a single packet,” confirming
23 once again that a “portion” is an entity that corresponds to a single channel.

24 Accordingly, for the above specified reasons, I conclude that a “portion of a
25 communication,” as used in the claims of the ’630 patent, is “the fraction or portion of a frame
26 carried by one channel.”
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2. **“Element [of a] Communication” / “Element [of a] Portion” / “Elements” / “Element of a Portion” (Claims 3, 5, 8, 13-15, 21-23, 45-48, 50, 52, 73, 76, 79, 89, 113, 114, 116, 117)**

One of ordinary skill in the art at the time the '630 patent's application was filed in 1999 would have understood that the term “element [of a] communication” (and related terms) in the claims of the '630 patent means “a portion (e.g., a byte) of a ‘mini-frame’ that is individually encoded for transmission across one of a plurality of logical channels,” where a “mini-frame” is “a fraction or portion of a communication received from or sent to a media access control layer from a physical layer device and that is carried by one channel.”

BASIS AND REASONS:

The claims and specification again provide guidance as to the meaning of this term. First, it is clear to me that the claims distinguish an “element of a communication” and a “portion of a communication.” Indeed, some claims refer to an “element of a communication portion,” demonstrating that an “element” is a part of a “portion.” *See, e.g., id.* at 17:9-14; *id.* at 20:50-55. Likewise, other claims describe the process of “distributing elements of said communication into multiple portions” (i.e. each “portion” is formed from the “elements” that were distributed to it), again demonstrating that an “element” is a component of a “portion.” *See, e.g., id.* at 15:19-20; 20:46-47. In fact, I identified no claim referring to an “element” in which this distinction was not maintained. In my opinion, this confirms that one of ordinary skill in the art in 1999 would understand that an “element of a communication” is a part of a “portion of a communication.”

Having thus determined that an “element” is a part of a “portion,” it must also be the case that an “element of a communication” is a portion of a “mini-frame.” The specification explains repeatedly that a “mini-frame” is just the “portion of the frame carried by one channel” (i.e., after the MAC layer frame has been sub-divided into “portions.”). *See id.* at 2:49; *id.* at 5:48-53. As explained above, this is equivalent to how the term “portion of a communication” should be understood. *See supra* Part II.C.1. When the specification explicitly refers to “elements,” it does so in a way that confirms that an “element” is a portion of a “mini-frame.” For instance, in describing the procedure for allocating “elements” to channels, the specification

1 explains that these “elements” are allocated to the logical channels on a “round-robin basis” such
2 that each channel ultimately carries one “mini-frame” or “mini-packet.” Because the “elements”
3 are the fundamental units that are allocated to the channels to form the “mini-frames,” they must
4 be portions of “mini-frames.” *See* ’630 patent at 6:64-7:6. Likewise, when the specification
5 describes how Ethernet frames are encoded for transmission along the communication channels, it
6 explains that it is the individual “elements” that are encoded for transmission. *See id.* at 7:40-53.
7 It is further explained that the encoding may be accomplished using the well known 8B/10B
8 procedure for the coding of individual bytes, thus reflecting a situation where the “element” is
9 one byte in size. *See id.* It is then explained that a “PCS [Physical Coding Sublayer] module” at
10 “a receiving entity” “decodes the mini-frame” to “provide[] the recaptured bytes to a collector.”
11 *See id.* Because it is the “recaptured bytes” that are extracted when a “mini-frame” is decoded, it
12 must be that an “element” is a portion of a “mini-frame.” I find no other direct references to the
13 term “element” in the specification, and I certainly do not find anything to suggest that an
14 “element” could be something other than a “portion of a mini-frame.”

15 NetApp’s proposed construction also specifies that an “element of a
16 communication” be transmitted “across one of a plurality of logical channels.” As explained
17 above, one of ordinary skill in the art would conclude from the claims and specification that a
18 “portion of a communication” is in fact transmitted across only one of a plurality of
19 communication channels. *See supra* Part II.C.1. Likewise, an “element of a communication” is a
20 part of a “portion of a communication.” Because an “element” is only a sub-part of a larger entity
21 that is transmitted across only a single channel, an “element” must also be transmitted on only a
22 single channel.

23 Finally, NetApp’s proposed construction requires that the “elements” be
24 individually encoded for transmission across a single channel. And indeed, the specification
25 describes nothing other than this. All of the embodiments depicted in the specification include at
26 least one Physical Coding Sublayer (“PCS”), *see* Figures 1 and 2, which is the only structure
27 disclosed in the specification that carries out any type of encoding, and the parties have agreed
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1 that it does its encoding at the “physical layer,” which is the layer actually associated with the
2 physical transmission medium. *See* Agreed Constructions, Supplemental Joint Claim
3 Construction and Prehearing Statement, Exh. Q [Document No. 74-8]; ’630 patent at Figure 2.
4 Each of the PCS modules responsible for carrying out the PCS functions are depicted as being
5 linked to a single transmission channel and receiving input from a “distribution module,” which
6 the parties have already agreed is responsible for “divid[ing] across multiple logical channels an
7 Ethernet frame received from a MAC module.” *See* Agreed Constructions, Supplemental Joint
8 Claim Construction and Prehearing Statement, Exh. Q [Document No. 74-8]; ’630 patent at
9 Figures 1 and 2. Because the entity responsible for encoding receives its inputs from the entity
10 responsible for dividing frames into mini-frames and apportioning the “elements” among those
11 mini-frames, and because the coding module is directly associated with the ultimate transmission
12 medium, it must be the case that the “elements” are encoded for transmission.

13 I find additional confirming evidence for this proposition elsewhere in the
14 specification. For instance, the specification explains that the “PCS modules . . . perform coding
15 of Ethernet frame *elements*” *See* ’630 patent at 7:41-43. Similarly, the specification
16 repeatedly and consistently points to bytes (or smaller units) as the unit of a communication that
17 is encoded for transmission. For instance, the specification explains that “the remainder of the
18 packet is received by the distributor, distributed *one byte at a time* (in round robin fashion) to
19 each channel, encoded, and transmitted.” *See id.* at 11:60-62. Similarly, the specification
20 explains that the PCS module may perform 8B/10B or 4B/5B coding schemes to encode or
21 decode data. *See id.* at 7:41-53; *id.* at 10:8-19. Such schemes operate on a byte or half-a-byte,
22 respectively. And indeed, the specification explains that “the last *byte* of each mini-frame and the
23 last *byte* of the packet are recognized by their distinctive codes,” demonstrating that it is the bytes
24 that have been encoded. *See id.* at 12:35-36. Finally, the specification explains that “the
25 distributor sends the first *byte* of each channel’s mini-frame to a PCS for encoding.” *See id.* at
26 11:50-51. Because a byte has only 8 bits of information, it is too small to correspond to either a
27 “frame” or a “mini-frame.” Rather, it can only correspond to the most granular information unit
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1 used in the claims, which is the “element.” Thus, the specification supports the conclusion that it
2 is the “elements of a communication” that are encoded for transmission.

3 For all the above specified reasons, one of ordinary skill in the art in 1999 would
4 therefore conclude that an “element of a communication” is “a portion (e.g., a byte) of a ‘mini-
5 frame’ that is individually encoded for transmission across one of a plurality of logical channels,”
6 where a “mini-frame” is “a fraction or portion of a communication received from or sent to a
7 media access control layer from a physical layer device and that is carried by one channel.”

8 Though Sun contends that the term “element of a communication” is “clear on its
9 face,” it is in fact clear to me that guidance is needed as to its meaning. Indeed, the term “element
10 of a communication” has no clear meaning to one of skill in the art. Taken “on its face,” as Sun
11 suggests, the term is indistinguishable from the similarly nebulous claim term “portion of a
12 communication.” Yet the claims rely on both of these terms often, making a definitive
13 understanding of their meanings critical.

14 **III.**

15 **MATERIALS REVIEWED**

16 A list of the materials that I reviewed in preparing this report is attached as Exhibit

17 B.

18 **IV.**

19 **COMPENSATION**

20 My compensation for consulting on this matter is \$525 per hour. My
21 compensation does not depend on the outcome of this dispute.

22 **V.**

23 **PREVIOUS TESTIMONY**

24 A listing of the testimony I have given in the past seven years is attached to this
25 report as Exhibit C.

1 I declare under penalty of perjury under the laws of the United States of America
2 and the State of California that the foregoing is true and correct.

3 7/7/08 Anthony Acampora
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